Fabrizio Baldassari and Oana Matei, "The Early Modern Study of Plants, an Essential Part of Natural Philosophy, Manipulation Flora: Seventeenth-Century Botanical Practices and Natural Philosophy", special issue *Early Science and Medicine*, Volume 23, No. 5-6, pp. 413-587 (2018).

By Speranța Sofia Milancovici

DOI 10.2478/glp-2019-0013

of the International Conference *Manipulating Flora: Gardens and Laboratories in the Renaissance and Early Modern Period*, held in January 2016. The scientific event was organized with the financial support of the Romanian Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFSCIDI), Vasile Goldiș Western University of Arad, the Institute for Research in Humanities of the University of Bucharest and the Botanical Garden Dimitrie Brandza, the last one being the geographical starting point for this scientific endeavor.

The volume focuses on the philosophical investigations of flora in the seventeenth century, through the eye of different scholars who addressed this subject from different perspectives. The meeting point of all the approaches is that plants, in the early modern period, were not considered only as physical elements that may be interesting for their medical use, their fascinating and unusual form, or because they seemed rare at the time, but also as fitting models to explain natural phenomena and, more generally, life itself: "To sum up, in the seventeenth century plants formed a category of investigation that played not only an epistemic role, providing knowledge about the internal organization, structure, and functioning of plants, it also served instrumental purposes, illustrating fundamental processes of nature (such as fermentation, growth, maturation, and putrefaction)." (BALDASSARRI & MATEI 2018: 413)

As we can observe in the history of that subject, since the Middle Ages, the practical considerations were more tempting for scholars, especially for medical and pharmacological purposes. The main references were Dioscorides' *Materia Medica*, Galen's *De simplicum medicamentorum temperamentis ac facultatibus* or Pliny's *Naturalis historia*, but also *De causis plantarum* of Theophrastus. During the Renaissance, the study of plants slowly became more autonomous, and we can discuss about its emancipation to a distinct botanical discipline. From this point of view, we can mention the works of Marcello Malpighi, John Ray, Nehemiah Grew, Jan Baptist van Helmont and Andrea Cesalpino, that show inter-

For the researchers focused on the seventeenth century botanical practices and natural philosophy, the end of 2018 publishing year offers a complex and heterogeneous approach of this field of study: the volume 23, no. 5-6, of *Early Science and Medicine*, coordinated by Fabrizio Baldassarri and Oana Matei, the direct result

est in classifying plants, defining their structure, and in observing the natural bodies of plants as important ways to explore and explain the natural world (BALDASSARRI & MATEI 2018: 414-416 passim). In this philosophical landscape, René Descartes came up with his unique and alternative interpretation of plants, in terms of mechanical philosophy – like clocks or self-moving machines.

What stands out, even after a brief analysis of the volume's textual component, is the difficulty to keep a clear perspective on concepts used more than half a millennium ago, in a pre-Linnean landscape, when there was no consensus either on what botany meant or which purposes should it served. Subsidiary to medicine at the beginning, the investigation of the world of plants slowly developed to a much more complex endeavor, determining philosophical debates and alchemical experiments.

The first article of the volume, *Touch Me Not: Sense and Sensibility in Early Modern Botany*, offers Guido Giglioni's perspective on the reconstruction of the philosophical debate arisen around the sensitive plant *mimosa pudica*. As the article suggests, the designation *Touch-me-not* is the common noun that refers to two different plants: *impatiens* and *mimosa pudica*. The first one has the property to send seeds up to several meters away, at the slightest touch. The second one, *mimosa pudica*, folds its leaves when in contact with an external agent (*pudica* being the Latin adjective for *shrinking*). Because of this kind of response to stimuli, it became a plant chosen with predilection for experiments connected to the memory of vegetal organisms. "It seems, therefore, that at the end of the seventeenth century an aura of mystery was still surrounding the sensitive plant. As we will see, a number of connotations – exotic, colonial, commercial, supernatural and sexual – converged in the course of three centuries to define the early modern image of *mimosa pudica*." (GIGLIONI 2018: 422) Giglioni's carefully lists the semantic associations, the cultural and social interpretations, the anthropological perspectives, and the history of this long and complicated process of botanical discoveries and classifications.

The second article, Doina-Cristina Rusu, *Same Spirit, Different Structure: Francis Bacon on Inanimate and Animate Matter*, focuses on Francis Bacon's way to understand spiritual matter as a unity which has different functions and qualities within bodies. According to Bacon, it is the relation between the spiritual and the tangible matter that determines the diversity of the natural world. As a case study to illustrate this special relation, Rusu proposes the model of spontaneous generation as a process of transmuting species.

In the same line of Baconian studies, Dana Jalobeanu outlines, in her essay *Spirits Coming Alive: The Subtle Alchemy of Francis Bacon's Sylva Sylvarum*, that experiments with plants played an essential instrumental role in Bacon's natural philosophy and that some key concepts are shaped in *Sylva Sylvarum*. Even more, contributing to the literature concerned with the relation between experiments and theory in Early Modernity, Jalobeanu argues that experiments in *Sylva Sylvarum* offered Bacon a good opportunity to refine his theoretical vocabulary. In fact, Jalobeanu claims that *Sylva Sylvarum's* experiments with plants are used by Bacon to study the chemical transformations associated with fundamental processes of nature and that the term *concoction* is a generic, umbrella concept that covers the transformations of matter from the first quaternion (watery) into the second quaternion (oily).

Vegetal magnetism is the key concept that structures the essay of Lucie Čermáková, *Athanasius Kircher and Vegetal Magnetism: Analogy as a Method*. Taking analogy as a method that must replace or, at least, complete the mainly descriptive approach on plants popular during the sixteenth and seventeenth centuries, Kircher's endeavor in one chapter of *Magnes sive de arte magnetica* is to use the sunflower as an instrument of inquiry into nature. Taking the case of the sunflower that rotates following the sun, Kircher describes an instrument that consists in a plant floating in a water basin and has a needle in the center of its blossom which should work as clock showing time. This *horologicum* never worked, but in fact, Kircher's ultimate point was to do demonstrate by analogy the celestial magnetism and thus offer

a supplement to the contemporary debate, not a proof. For him, analogy was supposed to work as an epistemic tool, illustrating, and explaining universal natural phenomena.

In his text, *Descartes' Bio-Medical Study of Plants: Vegetative Activities, Soul and Power*, Fabrizio Baldassarri proposes a description of Descartes' vision on vegetal world. More exactly, the article explains how plants illustrate vegetative activities. The basic functions of life are addressed from the perspective of a mechanical vegetative power which allows Descartes to propose plants as models for vegetative operations.

Oana Matei in her article, *Appetitive Matter and Perception in Ralph Austen's Projects of Natural History of Plants*, argues that Ralph Austen, a naturalist and experimenter connected with the Hartlib Circle, developed an appetitive matter theory of Baconian provenance. Matei's paper introduces Austen (via Bacon) as an exponent of an aspect of late-Renaissance thinking about appetitive matter that seemed to fall out of favour in the second half of the seventeenth-century.

The last article of the volume, *Plant and Soil Chemistry in Seventeenth-Century England: Worsley, Boyle and Coxe*, presents Antonio Clericuzio's chemical approach on agricultural practices in seventeenth century England. Clericuzio points out to the chemical substratum of the experimental and technological investigations of mid-seventeenth-century natural historians and philosophers, gardeners, agriculturalists and alchemists. Clericuzio claims that agricultural chemistry, a mixture of practice and theory, contributed to the development of fertilization techniques and significantly influenced the research carried out by the Royal Society in the 1660s and in the 1670s.

Apart from being, to my knowledge, the first volume devoted to the study of philosophical investigations of plants in early modern thought, another remarkable characteristic of this special issue lays in its complexity. The contributions to this volume successfully prove that early modern naturalists used plants as instruments of inquiry into fundamental processes of nature, as

tools to explore the causes of natural processes, and sometimes even as devices to illustrate properties and qualities of matter.